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DepED
DEPARTMENT OF EDUCATION

Lesson Exemplar for Mathematics

Quarter 4
Lesson
2

Lesson Exemplar for Mathematics Grade 8
Quarter 4: Lesson 2 (Week 2)
SY 2025-2026

Development Team

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MATHEMATICS / QUARTER 4 / GRADE 8

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	Learners demonstrated knowledge and understanding of measures of variability for ungrouped data.
B. Performance Standards	By the end of the quarter, the learners are able to calculate measures of variability for ungrouped data. (DP)
C. Learning Competencies and Objectives	The learners investigate different measures of variability for ungrouped data. 1. Draw conclusions using range, mean deviation, and standard deviation for ungrouped data 2. Solve real-life situations using range, mean deviation, and standard deviation for ungrouped data 3. Identify the strengths and weaknesses of range, mean deviation, and standard deviation
D. Content	Measures of variability for Ungrouped Data • Range • Mean deviation for ungrouped data • Standard deviation for ungrouped data
E. Integration	

II. LEARNING RESOURCES
Olympian LED Displays. (2024). *ScoreBoards.com BB-1610-4 Basketball Scoreboard.* https://olympianled.com/product/scoreboards-com-bb-1610-4-basketball-scoreboard/

III. TEACHING AND LEARNING PROCEDURE		**NOTES TO TEACHERS**
A. Activating Prior Knowledge	**DAY 1** **1. Short Review** Begin with a brief, active review session where students recall concepts related to measures of variability taught in the previous week. Use a quick quiz or a few verbal questions to review how to calculate the range, mean deviation, and standard deviation for ungrouped data.	Possible answers: 1. The range is calculated by subtracting the smallest value from the largest value in the dataset. 2. Mean deviation is the average of the absolute

	Example Questions: 1. "How do we calculate the range of a dataset?" 2. "What is mean deviation and how is it different from standard deviation?" 3. "Can someone enumerate the steps to calculate standard deviation?" **2. Feedback (Optional)** If homework was assigned, acknowledge learners' attempts and provide feedback on their answers. Identify common errors and correct them to ensure understanding before moving to new content.	differences between each data point and the mean of the dataset. Similarly, standard deviation, measures the dispersion of data points relative to the mean, however it squares the differences before averaging and then takes the square root of that average. 3. Steps: 1. Find the mean (average) of the dataset. 2. Subtract the mean from each data point to find the deviations. 3. Square each deviation. 4. Find the average of these squared deviations. Take the square root of this average to obtain the standard deviation.
B. Establishing Lesson Purpose	**1. Lesson Purpose** Inform the students of the lesson's focus, say: "Today, we will learn how to draw meaningful conclusions using the measures of variability we studied last week" Link the topic of the week to previous learning. Teacher may say: "Last week, we practiced calculating the range, mean deviation, and standard deviation. Understanding these concepts is crucial for interpreting data and making informed decisions." **2. Unlocking Content Area Vocabulary** Introduce and practice the key vocabulary and phrases that will be used throughout the lesson. • **Variability** is the degree to which data points in a data set differ from a measure of central tendency.	

	• **Range** is the difference between the highest and lowest values in a data set. • **Mean Deviation** refers to the average of the absolute differences between each data point and the mean. • **Standard Deviation** is a measure of the amount of variation or dispersion in a set of values. • **Homogeneous data** are data that are uniform of similar, that is it has low variability. • **Heterogeneous data** are data that are diverse or varied, that is it has high variability. • **Outliers** are data points that are relatively extremely high or extremely low within a data set.	
C. Developing and Deepening Understanding	**SUB-TOPIC 1: CALCULATING THE RANGE OF UNGROUPED DATA** **1. Explicitation** Begin by asking students to share familiar examples of ranges, such as: "What is the range of ages in your family?" or "What is the range of scores you've seen in your favorite sports matches?" Search image of basketball score board. Sample figure: https://olympianled.com/product/scoreboards-com-bb-1610-4-basketball-scoreboard/ **2. Worked Example** Example 1: The following are the daily temperatures for a week: 22°C ,25°C ,28°C, 24°C, 27°C, 30°C, 26°C Calculate the range step-by-step with the class: 1. Identify the highest value: **30°C.** 2. Identify the lowest value: **22°C.** 3. Subtract the lowest value from the highest: **30−22 = 8°C** What the Range Tells Us: • The range of 8 °C indicates that over the course of the week, the temperature varied by 8°C from the lowest to the highest point. • This tells us that there is some level of variability in the temperatures throughout the week. The difference between the warmest and coolest days is 8°C, which can be considered moderate variability depending on the context (e.g., geographical location, season).	**Explicitation** Begin by asking students to share familiar examples of ranges, such as: "What is the range of ages in your family?" or "What is the range of scores you've seen in your favorite sports matches?" *(use the figure)* Discuss their answers and connect them to the concept of range. Next, discuss the strengths and weaknesses of using range: Strengths: • Easy to calculate and understand. • Gives a quick sense of data spread. Weaknesses: • Only considers the extreme values, ignoring the

	Example 2: Imagine two farmers are monitoring the growth of tomato plants in their respective fields. They measure the height of 10 tomato plants after one month of growth. The heights (in centimeters) are as follows: • **Farmer A's Tomato Plants:** 45,50,55,60,62,65,70,72,75,80 • **Farmer B's Tomato Plants:** 48,49,51,52,53,54,55,56,57,58 Calculate the range of the growth of tomato plants of two farmers. Compare the variability (range) of the two. **3. Lesson Activity** Students will work in. pairs to calculate the range for various data sets. Provide students with several datasets for different categories and ask them to calculate the range and interpret the variability. Encourage them to consider the strengths and weaknesses of using the range in their analysis. **Scenario 1: Exam Scores of Students** • **Class A Exam Scores:** 65,70,75,80,85,90,95,100,105,110 • **Class B Exam Scores:** 85,86,87,88,89,90,91,92,93,94 **Instructions:** 1. Calculate the range for Class A and Class B exam scores. 2. Interpret what the range indicates about the variability in exam scores for each class. 3. Discuss the strengths and weaknesses of using the range to measure variability. **Scenario 2: Prices of Different Products in a Store** • **Store A Product Prices (in dollars):** 5,10,15,20,25,30,35,40,45,50 • **Store B Product Prices (in dollars):** 22,23,24,25,26,27,28,29,30,31 **Instructions:** 1. Calculate the range for Store A and Store B product prices. 2. Interpret what the range indicates about the variability in product prices for each store. 3. Discuss the strengths and weaknesses of using the range to measure variability.	distribution of the rest of the data. • Can be misleading if there are outliers. **Worked Example** Discuss what this range tells us about the temperature variability during the week, including the strengths and weaknesses of using range. Give the students the second scenario below and let them find the range and interpret it. **Answer to Example 2:** Farmer A: The range of 35 cm indicates significant variability in the growth of the tomato plants, with the tallest plant being 35 cm taller than the shortest plant. Farmer B: The range of 10 cm indicates much less variability in the growth of the tomato plants, with the tallest plant being only 10 cm taller than the shortest plant. Comparison: Comparing the ranges, Farmer A has a much higher range (35 cm) than Farmer B (10 cm), indicating greater variability in the growth of tomato plants in Farmer A's field.

DAY 2

SUB-TOPIC 2: CALCULATING MEAN DEVIATION FOR UNGROUPED DATA

1. Explicitation

Ask questions like: "How consistent are your grades across different subjects?" or "What does it mean if something is very consistent or not consistent at all? Discuss their responses and connect them to the concept of consistency.

2. Worked Example

Scenario 1: Imagine a teacher wants to understand the consistency of test scores in a class. The test scores (out of 100) for 10 students are: 70, 75, 80, 85, 90, 95, 100, 105, 110, 115.

Guide the students on how to calculate the Mean Deviation:

a. Calculate the Mean:

$$\text{Mean} = \frac{70+75+80+85+90+95+100+105+110+115}{10} = 92.5$$

b. Calculate the Absolute Deviations of each score from the Mean:

$|70-92.5|=22.5$
$|75-92.5|=17.5$
$|80-92.5|=12.5$
$|85-92.5|=7.5$
$|90-92.5|=2.5$
$|95-92.5|=2.5$
$|100-92.5|=7.5$
$|105-92.5|=12.5$
$|110-92.5|=17.5$
$|115-92.5|=22.5$

c. Find the Mean Deviation:

Sum of absolute deviations =
$22.5+17.5+12.5+7.5+2.5+2.5+7.5+12.5+17.5+22.5 = 125$

$$\text{Mean Deviation} = \frac{125}{10} = 12.5$$

Scenario 2: Imagine two classes, Class A and Class B, have completed the same math test. The teacher wants to compare the consistency of test scores between the two classes. The test scores (out of 100) for the 10 students in each class are as follows:

- **Class A Exam Scores:** 70,75,80,85,90,95,100,105,110,115
- **Class B Exam Scores:** 72,74,76,78,80,82,84,86,88,90

Answers to Lesson Activity 1:

1. Exam Scores
- **Class A:**
  - Range: 110 – 65 = 45
  - Interpretation: Diverse performance levels among students.
- **Class B:**
  - Range: 94 − 85=9
  - Interpretation: Consistent performance among students.
- **Strengths:** Quick insight into the spread of scores.
- **Weaknesses:** Sensitive to outliers, ignores distribution of scores.

2. Prices of Different Products in a store
- **Store A:**
  - Range: 50 – 5 = 45
  - Interpretation: A wide range of products with different prices.
- **Store B:**
  - Range: 31− 22=9
  - Interpretation: A more uniform pricing strategy.

Strengths: Quick insight into the price spread.
Weaknesses: Sensitive to outliers, ignores distribution of prices.

	Let the students calculate the mean deviation. Ask the students how to interpret the results of two classes. Then, tell them to compare the variation of scores from two classes. Discuss the Interpretation: Class A: The mean deviation of 12.5 indicates that, on average, each student's score deviates by 12.5 points from the mean score of 92.5. Class B: The mean deviation of 5 indicates that, on average, each student's score deviates by only 5 points from the mean score of 80. Guide students to interpret the result by asking them the following: a. Who is more consistent, Class A or Class B? b. What does the mean deviation of each Class suggest? **3. Lesson Activity** Provide students with several datasets for different categories and ask them to calculate the mean deviation and interpret the results. Include prompt questions to guide their analysis. **Scenario 1:** The managers of three stores, Store A, Store B, and Store C, want to understand the consistency of their monthly sales figures. The sales figures (in $1000) for the past year are as follows: • **Store A Monthly Sales (in $1000):** 20,22,25,23,24,21,22,23,24,25,26,27 • **Store B Monthly Sales (in $1000):** 30,31,33,32,30,29,28,31,32,33,34,35 • **Store C Monthly Sales (in $1000):** 15,20,25,30,35,40,45,30,25,20,15,10 **Instructions:** 1. Calculate the mean and mean deviation for Store A, Store B, and Store C's monthly sales. 2. Interpret what the mean deviation reveals about the consistency of monthly sales for each store. 3. Discuss the implications of these findings. **Prompt Questions:**	**Explicitation** Explain that mean deviation measures how much each data point differs from the mean, providing an average measure of consistency. Next, discuss the strengths and weaknesses of mean deviation. **Worked Example** Discuss to the students what the mean deviation tells about the data set. • The mean deviation of 12.5 indicates the average amount by which each test score deviates from the mean score (92.5). • A lower mean deviation suggests that the test scores are clustered closely around the mean, indicating consistent performance among students. • Conversely, a higher mean deviation would suggest that the test scores are spread out more widely from the mean, indicating less consistency in student performance. **Scenario 2:** Mean deviation of class A = 12.5 Mean deviation of class B = 5

a. What does a higher or lower mean deviation tell you about the consistency of the store's monthly sales?
b. How might this variability impact the store's inventory and staffing decisions?

Scenario 2:

- **Class A Heights (in cm):** 150,152,155,158,160,162,165
- **Class B Heights (in cm):** 145,150,155,160,165,170,175
- **Class C Heights (in cm):** 140,145,150,155,160,165,170

Instructions:

1. Calculate the mean and mean deviation for Class A, Class B, and Class C's student heights.
2. Interpret what the mean deviation reveals about the consistency of heights for each class.
3. Discuss the implications of these findings.

Prompt Questions:

a. What does the mean deviation tell you about the height distribution in each class?
b. How might these results be useful in organizing activities or seating arrangements?

DAY 3

SUB-TOPIC 3: CALCULATING THE STANDARD DEVIATION OF UNGROUPED DATA

1. Explicitation

Start by showing them the photos below. Ask them how much time they spend in doing an activity.

Then, ask questions like “How much do your daily activities vary in time spent?”



Answers to comparison of Class A and B:

a. Class B’s scores are more consistent, as indicated by the lower mean deviation (5), compared to Class A’s mean deviation (12.5).
b. The smaller deviations in Class B suggest that most students scored close to the mean, whereas Class A had a wider spread of scores.

Answer for Lesson Activity 2:

Scenario 1:
Means:

- Store A: 23.5
- Store B: 31.33
- Store C: 25

Mean deviations:

- Store A: 1.67
- Store B: 1.67
- Store C: 8.47

Store A and Store B: Both have a mean deviation of 1.67, indicating a similar level of consistency in monthly sales.
Store C: Higher mean deviation (8.47) indicates greater variability in monthly sales, suggesting more fluctuating sales.

Answer to prompt questions:

a. Higher Mean Deviation indicates that the store's

	Discuss their responses and connect them to the concept of variability. To do this, use the collected responses to illustrate the concept: • Low Variability: "When an activity takes the same amount of time every day, there's little to no variability. • High Variability: "For Student B, for activities that with large difference in time to accomplish. This high variability means that on some days, it's much shorter or longer than on others, making it unpredictable." • Moderate Variability: "Time varies but within a narrower range. This moderate variability." Transition to the Worked Example: "Having explored the concept of standard deviation and its pros and cons, let's dive into an example to learn the steps involved in calculating the standard deviation and how it helps us understand the variability in our data." **2. Worked Example** **Example 1:** Present this data set to the students: Weights of fruits (in grams): 100,102, 98,105, 99 Guide the students in recalling how to calculate the standard deviation. 1. Calculate the Mean: Mean =100.8 2. Calculate the Squared Deviations from the Mean: $(100 - 100.8)^2 = 0.64$ $(102 - 100.8)^2 = 1.44$ $(98 - 100.8)^2 = 7.84$ $(105 - 100.8)^2 = 16.81$ $(99 - 100.8)^2 = 3.24$ 3. Find the Average of the Squared Deviations: Variance = $\frac{0.64+1.44+7.84+16.81+3.24}{5} = 5.59$ 4. Take the Square Root to Find the Standard Deviation: Standard Deviation ≈ 2.37 Discuss to the students the interpretation of the standard deviation:	monthly sales are less consistent, with significant fluctuations from month to month. On the other hand, lower mean deviation is indicative that the store's monthly sales are more consistent. b. Stores with higher sales variability is more likely to face challenges in managing inventory and staffing. In contrast, stores with lower sales variability can plan inventory more accurately. **Scenario 2:** Means: • Store A: 157.43 • Store B: 160 • Store C: 155 Mean deviations: • Store A: 4.37 • Store B: 8.57 • Store C: 8.57 Implications: Class A: Lower mean deviation (4.37) indicates more consistent heights among students. Class B and Class C: Higher mean deviation (8.57) indicates greater variability in student heights.

	The standard deviation of 2.37 grams tells us about the variability of the fruit weights in the dataset. A smaller standard deviation indicates that the weights of the fruits are close to the mean weight, showing low variability. In this case, since the standard deviation is relatively low, it suggests that the fruit weights are fairly consistent and do not vary widely from the average weight. Why is it important to know the standard deviation? This consistency can be important for quality control in agricultural or retail settings, where uniform product size might be desired. For example, if a supermarket wants to ensure that the fruits they sell are of similar size and weight, a low standard deviation would be ideal. Conversely, if the standard deviation were higher, it would indicate greater variability in fruit weights, suggesting that the fruits are not as uniformly sized. This higher variability might be acceptable or even desirable in contexts where a variety of sizes is preferred, but it could be problematic where uniformity is important. **Example 2:** Imagine we have two batches of fruits from different orchards, and we want to compare the variability in their weights. • Orchard A Fruit Weights (in grams): 100,102,98,105,99 • Orchard B Fruit Weights (in grams): 110,108,115,107,112 Ask the following prompts to the students: 1. What does the standard deviation tell you about the consistency of fruit weights in Orchard A compared to Orchard B? *This prompt encourages students to interpret the meaning of the standard deviation values in terms of consistency and variability.* 2. How might the variability in fruit weights impact the packaging process for each orchard? *This prompt helps students think about practical applications of the standard deviation in a real-world context, such as the challenges and considerations in packaging fruits of varying sizes.* 3. Why is it important to understand the standard deviation when making decisions about product quality and marketing?	Process the answers of the learners to the prompt questions. **Explicitation** In discussing the variability, explain that variability refers to how much something changes over time or among different instances. Introduce the concept of standard deviation. Explain that standard deviation is a more precise measure of variability that considers the dispersion of data points around the mean. It gives more weight to larger deviations. Then, discuss the strengths and weaknesses of the standard deviation. Strengths: • Provides a more accurate measure of variability by considering all data points and giving more weight to larger deviations. • Widely used and accepted in statistical analysis. Weaknesses: • More complex to calculate and understand compared to range and mean deviation. • Can be influenced by extreme values or outliers.

	This prompt encourages students to reflect on the broader implications of variability and the importance of statistical measures in decision-making processes related to product quality and marketing strategies. **3. Lesson Activity** Group the students in a small group (max of 4 members each). Provide students with several datasets for different categories and ask them to calculate the standard deviation and interpret the results. Include prompt questions to guide their analysis. **Scenario 1: Daily Steps Recorded by Different Individuals Over a Week** • Individual A: 7000,7500,8000,8500,9000,9500,10000 • Individual B: 5000,5200,5400,5600,5800,6000,6200 **Instructions:** 1. Calculate the mean and standard deviation for Individual A and Individual B's daily steps. 2. Interpret what the standard deviation indicates about the variability in daily steps for each individual. 3. Discuss the implications of these findings. **Prompt Questions:** a. What does a higher or lower standard deviation tell you about the consistency of their daily steps? b. How might this variability impact their overall fitness or health goals? **Scenario 2: Scores of two students from a Series of Quizzes** • Student A: 85,88,90,92,91,87,89 • Student B: 70,75,80,85,90,95,100 **Instructions:** 1. Calculate the mean and standard deviation for Student A and Student B's quiz scores. 2. Interpret what the standard deviation indicates about the variability in quiz scores for each student.	**Answer to Worked Example 2**: Mean of Orchard A: 100.8 Mean of Orchard B: 110.4 Standard deviation of A: 2.48 Standard deviation of B: 2.87 Comparing the two orchards, Orchard A has more consistent fruit weights, while Orchard B shows more variability. This information can help in making decisions about processing, packaging, and marketing the fruits from each orchard. A lower standard deviation (as seen in Orchard A) is often preferred for uniformity, whereas higher variability (as seen in Orchard B) might need tailored approaches for handling and selling the produce. **Answers to Lesson Activity:** **Scenario 1:** a. Mean of Individual A = 8 500 Mean of Individual B = 5 600 Standard deviation of A = 1 000 Standard deviation of B = 400 b. Individual A: Higher standard deviation (1 000) indicates more variability in daily steps, suggesting inconsistency in their daily activity levels.

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<td>3. Discuss the implications of these findings.

Prompt Questions:
a. What does the standard deviation tell you about each student's performance consistency?
b. How might these results affect their study habits or approach to future quizzes?</td>
<td>Individual B: Lower standard deviation (400) indicates less variability, suggesting more consistency in their daily activity levels.

Scenario 2:
a. Mean of Student A = 88.86
Mean of Individual B = 85
Standard deviation of A = 2.23
Standard deviation of B = 10

b. Student A: Lower standard deviation (2.23) indicates very consistent performance on quizzes.
Student B: Higher standard deviation (10) indicates greater variability in quiz scores, suggesting fluctuating performance levels.</td>
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<td>D. Making Generalizations</td>
<td>DAY 4
1. Learners' Takeaways
Ask students to provide a real-life example (100-150 words) where you might use each measure of variability to draw conclusions. Explain why the measure is suitable for the example and what conclusions you can draw from it. For instance, consider scenarios like exam scores, daily steps, or sales figures.

2. Learners' Reflection
Explain the purpose of reflecting on their learning. Emphasize the importance of understanding how they learn and how they can improve their study strategies.
<table>
<tr><th>Reflection Prompt</th><th>Students' Response</th></tr>
<tr><td>What was the most challenging part of learning about measures of variability?</td><td></td></tr>
<tr><td>How did you overcome this challenge?</td><td></td></tr>
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<td>Sample answers:
• Range: In analyzing daily temperatures over a week, the range can show the temperature variation from the highest to the lowest point. This helps in understanding the weather pattern and preparing for extreme temperatures.

• Mean Deviation: When examining exam scores, mean deviation can indicate how consistent students'</td>
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		performances are. A low mean deviation means most students scored close to the average, suggesting a uniform understanding of the material. • **Standard Deviation:** In a business setting, standard deviation can be used to assess monthly sales variability. A high standard deviation might indicate seasonal fluctuations, requiring different inventory strategies.

Describe a strategy that helped you understand the concept of standard deviation.	
How can you apply what you've learned about data variability in real-life situations?	
What steps can you take to improve your understanding of statistical concepts in the future?	

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		NOTES TO TEACHERS
A. Evaluating Learning	**1. Formative Assessment** Activity 1. Students will compare three data sets using measures of variability and interpret the results to understand the consistency and spread of the data. Dataset 1 (Exam Scores): 75,80,85,90,95 Dataset 2 (Monthly Sales in Php 1000): 50,60,55,70,65 Dataset 3 (Running Times in minutes): 20,22,25,23,21 **Answer the following:** 1. What is the mean of each data set? 2. What is the range of each data set? 3. What is the mean deviation of each data set? 4. What is the standard deviation of each data set? 5. Which data set has the most consistent values? Explain your reasoning. 6. Which data set shows the most variability? What does this indicate about the data? **2. Homework (Optional)** The teacher may give Learning Activity Sheet 2 to the learners.	**Answers to Activity 1:** 1. Set 1: 85 Set 2: 60 Set 3: 22.2 2. Set 1: 20 Set 2: 20 Set 3: 5 3. Set 1: 6 Set 2: 6 Set 3: 1.44 4. Set 1: 7.07 Set 2: 7.07 Set 3: 1.72

<table>
<tr><td></td><td colspan="3"></td><td>5. Dataset 3 has the lowest mean deviation and standard deviation, indicating the most consistent values.

6. Datasets 1 and 2 both have higher ranges, mean deviations, and standard deviations, indicating more variability. This suggests greater differences in exam scores and sales figures compared to running times.</td></tr>
<tr><td rowspan="5">B. Teacher's Remarks</td><td>Note observations on any of the following areas:</td><td>Effective Practices</td><td>Problems Encountered</td><td rowspan="5">The teacher may take note of some observations related to the effective practices and problems encountered after utilizing the different strategies, materials used, learner engagement, and other related stuff.

Teachers may also suggest ways to improve the different activities explored/lesson exemplar.</td></tr>
<tr><td>strategies explored</td><td></td><td></td></tr>
<tr><td>materials used</td><td></td><td></td></tr>
<tr><td>learner engagement/ interaction</td><td></td><td></td></tr>
<tr><td>others</td><td></td><td></td></tr>
<tr><td>C. Teacher's Reflection</td><td colspan="2">Reflection guide or prompt can be on:
• <u>principles behind the teaching</u>
What principles and beliefs informed my lesson?
Why did I teach the lesson the way I did?
• <u>students</u>
What roles did my students play in my lesson?
What did my students learn? How did they learn?
• <u>ways forward</u>
What could I have done differently?
What can I explore in the next lesson?</td><td>Teacher's reflection in every lesson conducted/facilitated is essential and necessary to improve practice. You may also consider this as an input for the LAC/Collab sessions.</td></tr>
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